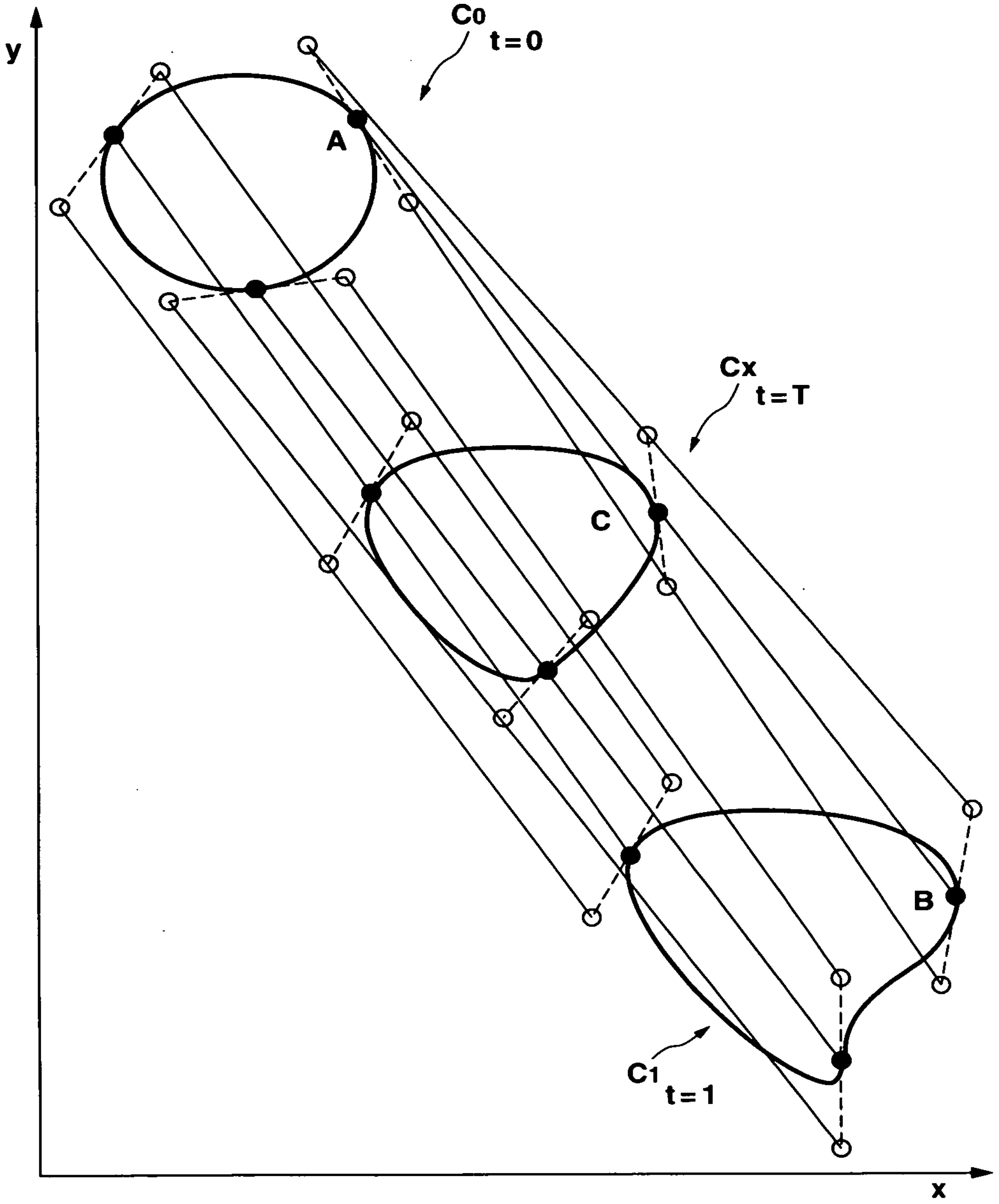


FIG.1

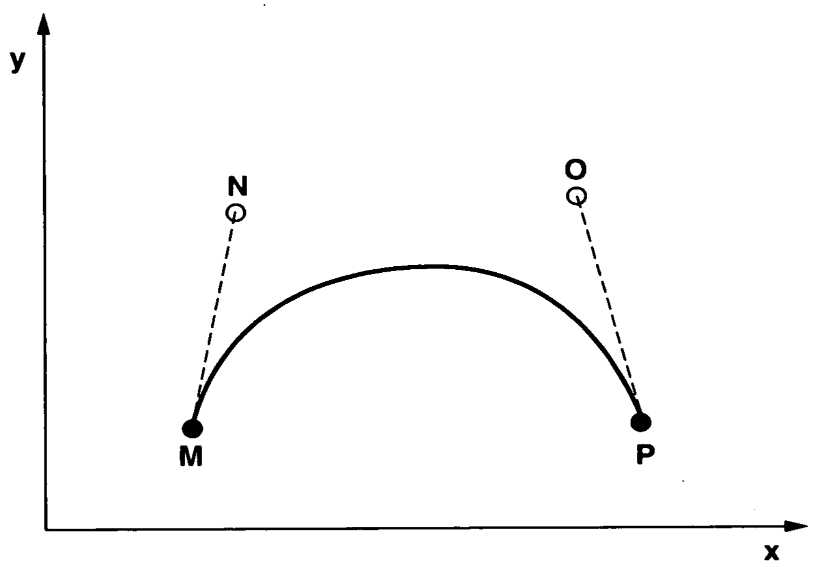


FIG.2

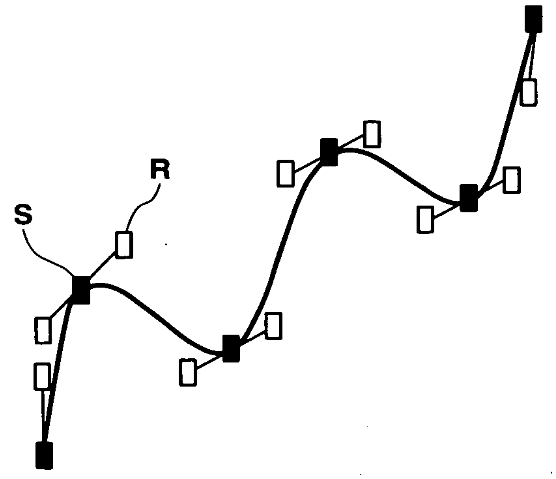


FIG.3

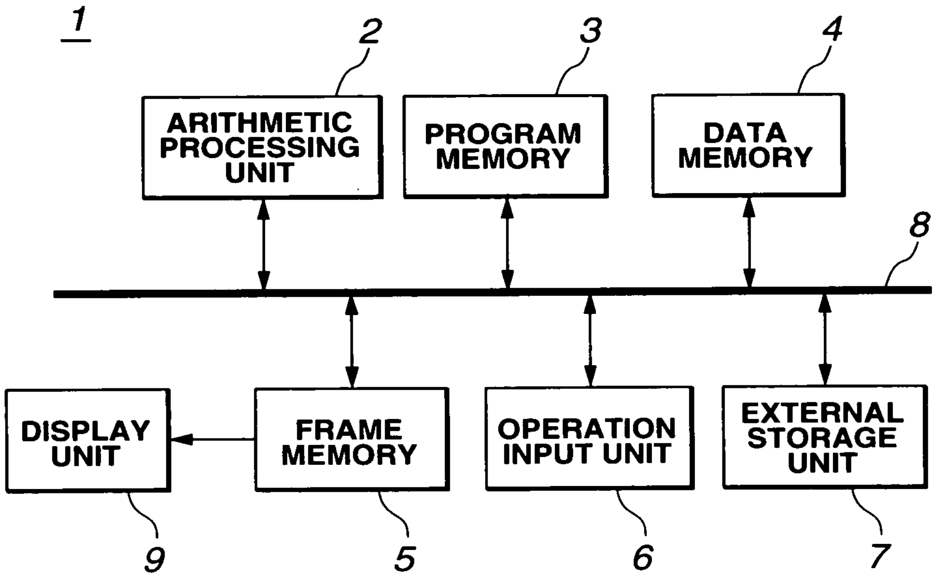

1
2
3
4
ARITHMETIC PROCESSING UNIT
PROGRAM MEMORY
DATA MEMORY
8
DISPLAY UNIT
FRAME MEMORY
OPERATION INPUT UNIT
EXTERNAL STORAGE UNIT
9
5
6
7

FIG.4

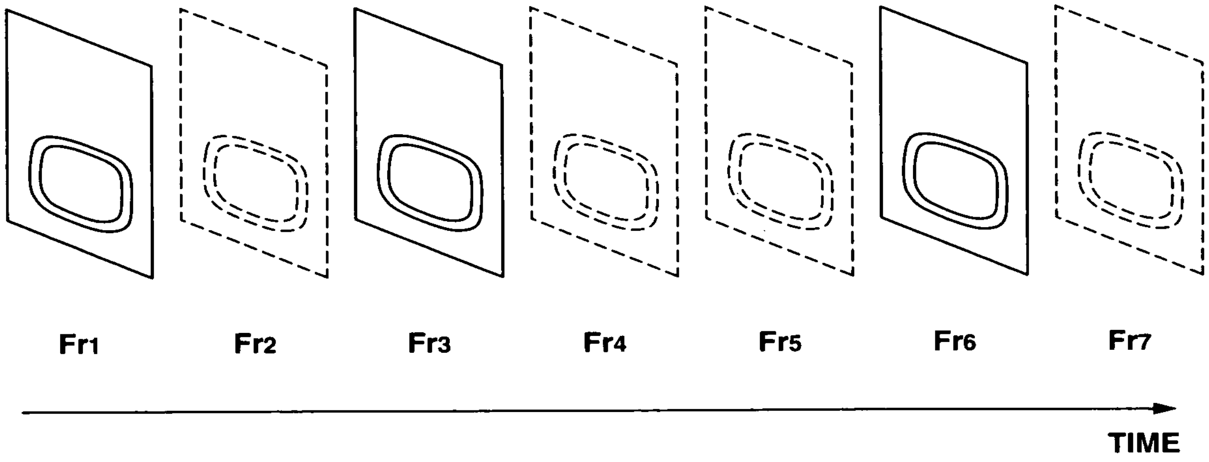


FIG.5

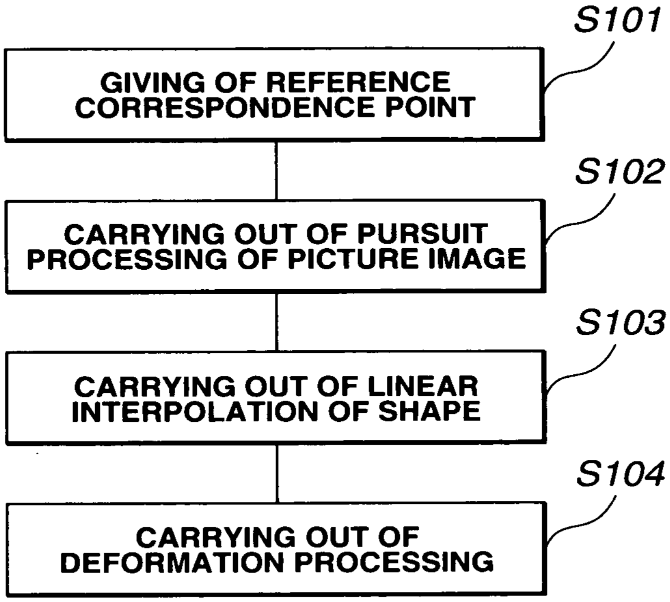

S101
GIVING OF REFERENCE CORRESPONDENCE POINT
S102
CARRYING OUT OF PURSUIT PROCESSING OF PICTURE IMAGE
S103
CARRYING OUT OF LINEAR INTERPOLATION OF SHAPE
S104
CARRYING OUT OF DEFORMATION PROCESSING

FIG.6

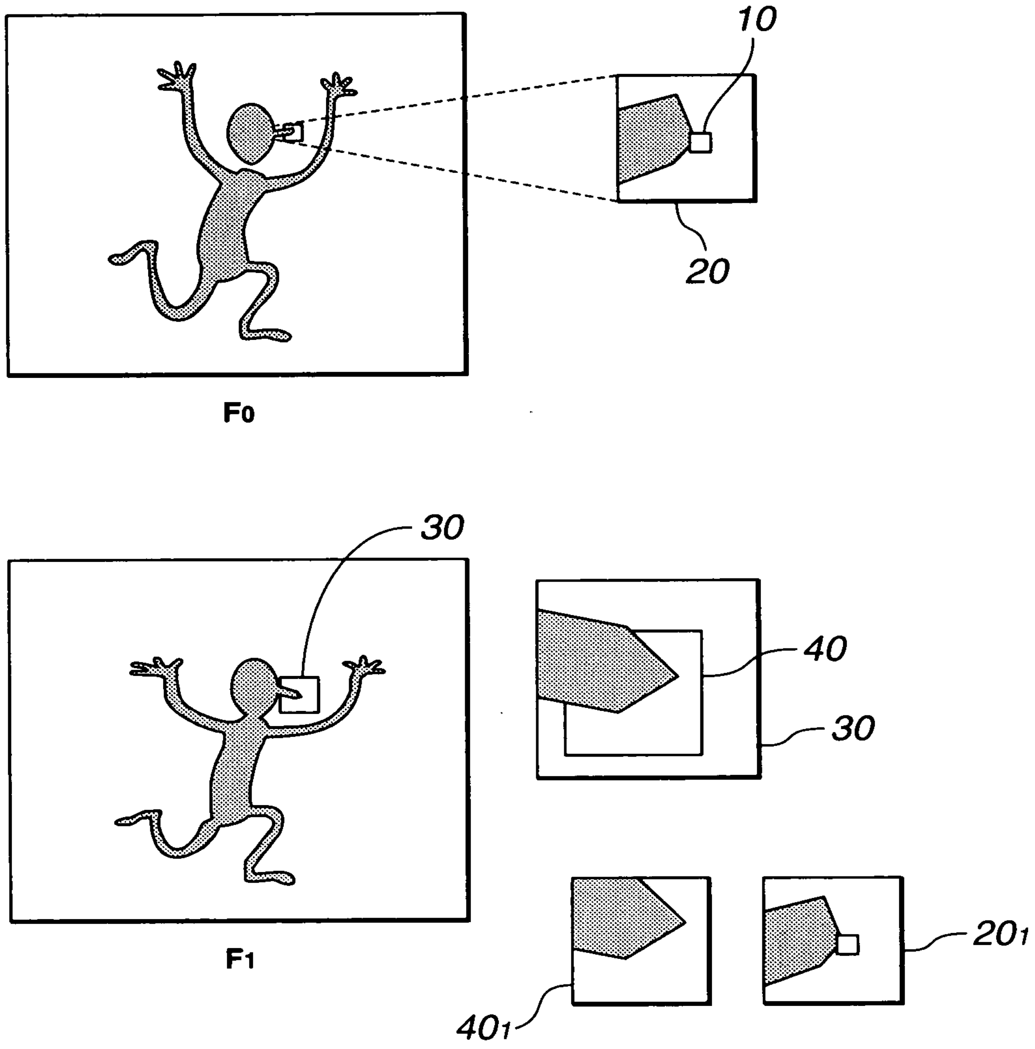


FIG.7

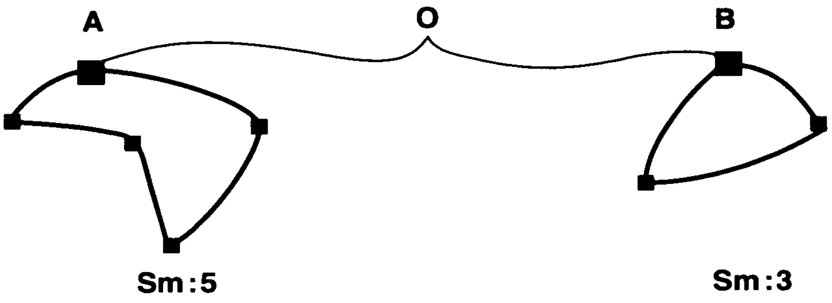


FIG.8

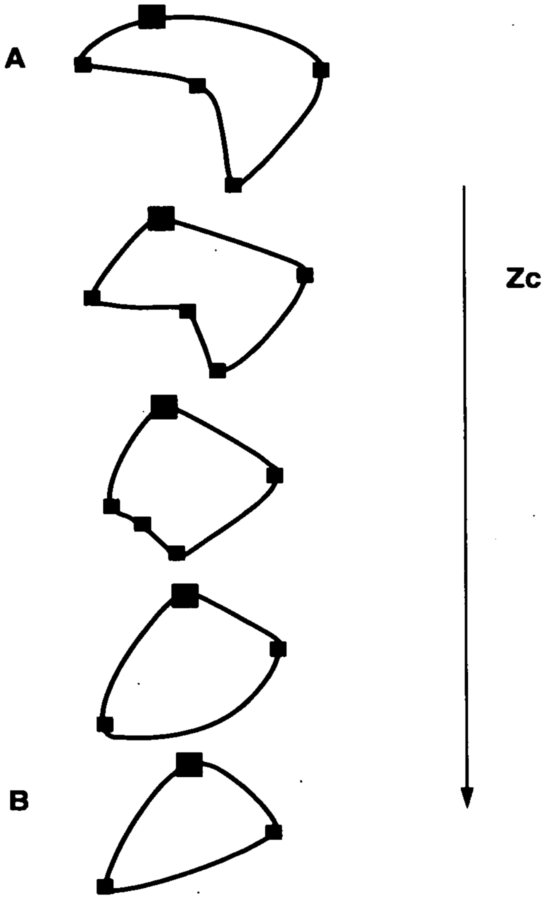


FIG.9

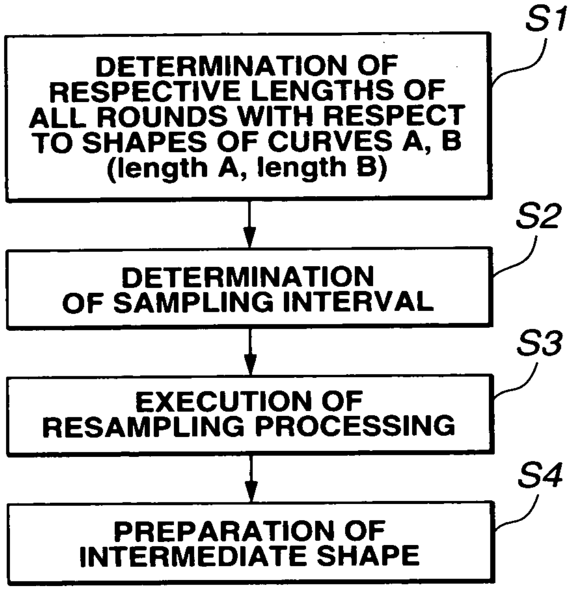

S1
DETERMINATION OF RESPECTIVE LENGTHS OF ALL ROUNDS WITH RESPECT TO SHAPES OF CURVES A, B (length A, length B)
S2
DETERMINATION OF SAMPLING INTERVAL
S3
EXECUTION OF RESAMPLING PROCESSING
S4
PREPARATION OF INTERMEDIATE SHAPE

FIG.10

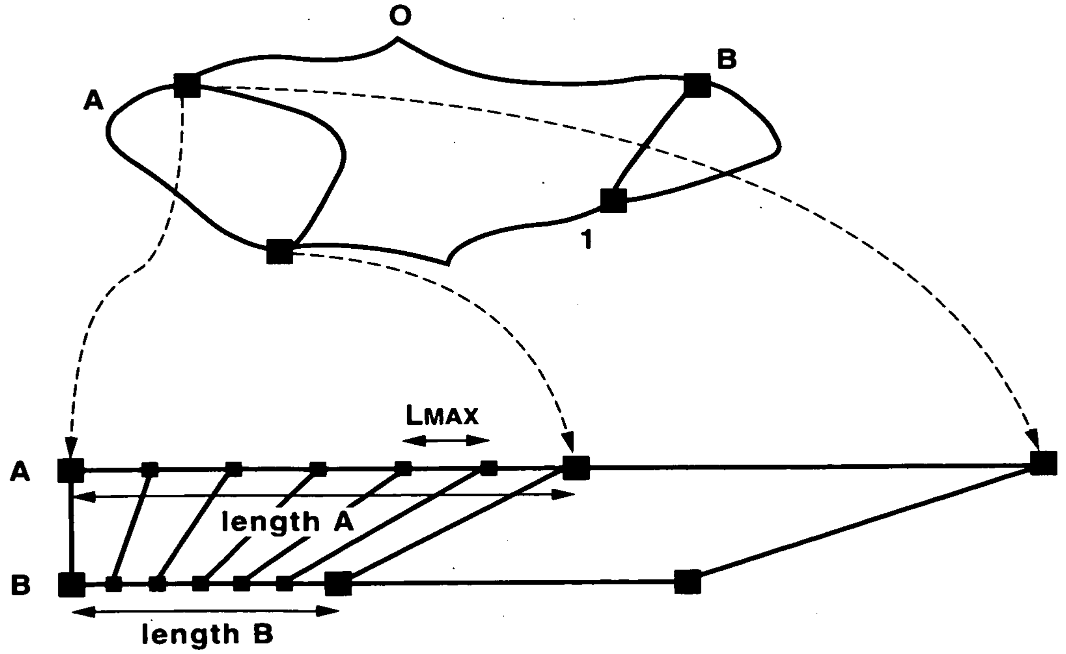

O
B
A
1
LMAX
A
length A
B
length B

FIG.11

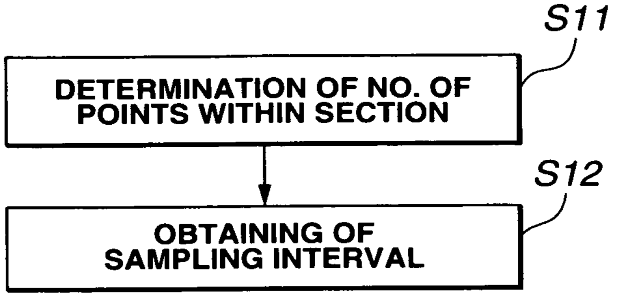

S11
DETERMINATION OF NO. OF POINTS WITHIN SECTION
S12
OBTAINING OF SAMPLING INTERVAL

FIG.12

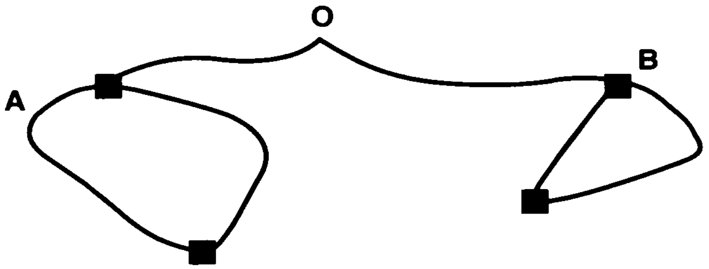

O
A
B

FIG.13

09/673202

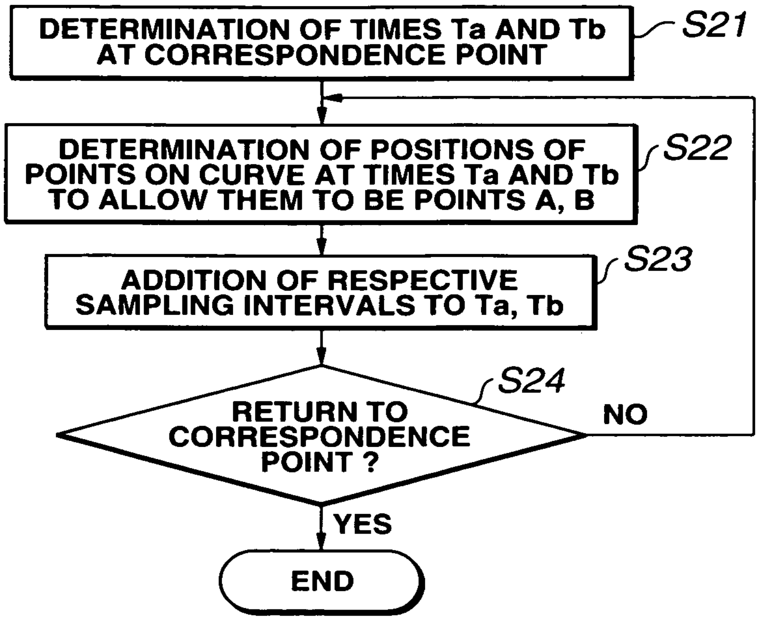

DETERMINATION OF TIMES Ta AND Tb AT CORRESPONDENCE POINT
S21
DETERMINATION OF POSITIONS OF POINTS ON CURVE AT TIMES Ta AND Tb TO ALLOW THEM TO BE POINTS A, B
S22
ADDITION OF RESPECTIVE SAMPLING INTERVALS TO Ta, Tb
S23
RETURN TO CORRESPONDENCE POINT ?
S24
NO
YES
END

FIG.14

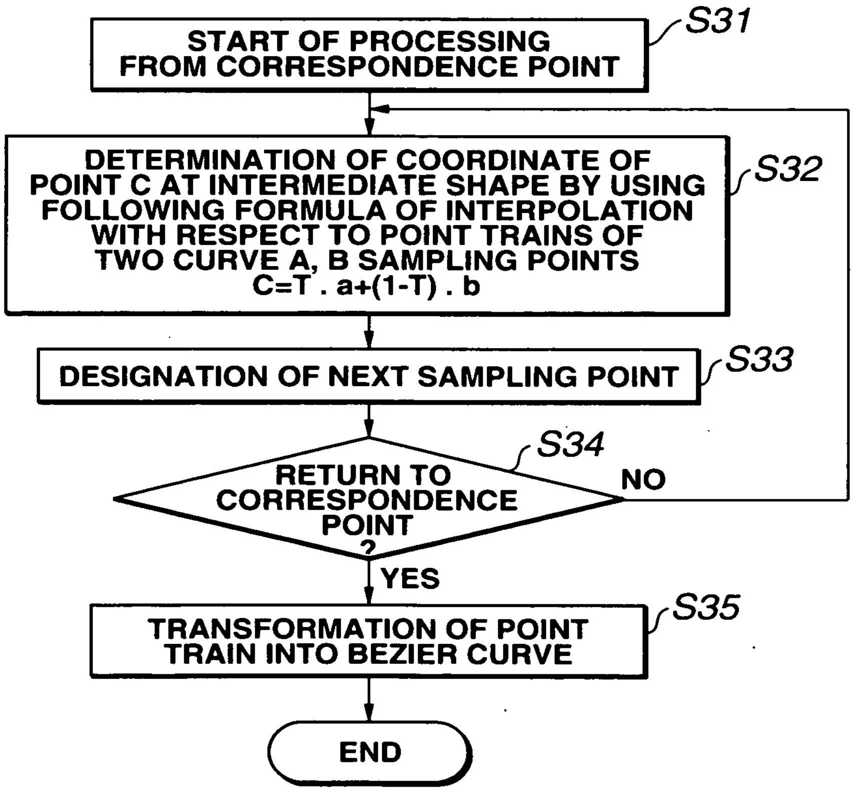

START OF PROCESSING FROM CORRESPONDENCE POINT
S31
DETERMINATION OF COORDINATE OF POINT C AT INTERMEDIATE SHAPE BY USING FOLLOWING FORMULA OF INTERPOLATION WITH RESPECT TO POINT TRAINS OF TWO CURVE A, B SAMPLING POINTS C=T . a+(1-T) . b
S32
DESIGNATION OF NEXT SAMPLING POINT
S33
RETURN TO CORRESPONDENCE POINT ?
S34
NO
YES
TRANSFORMATION OF POINT TRAIN INTO BEZIER CURVE
S35
END

FIG.15

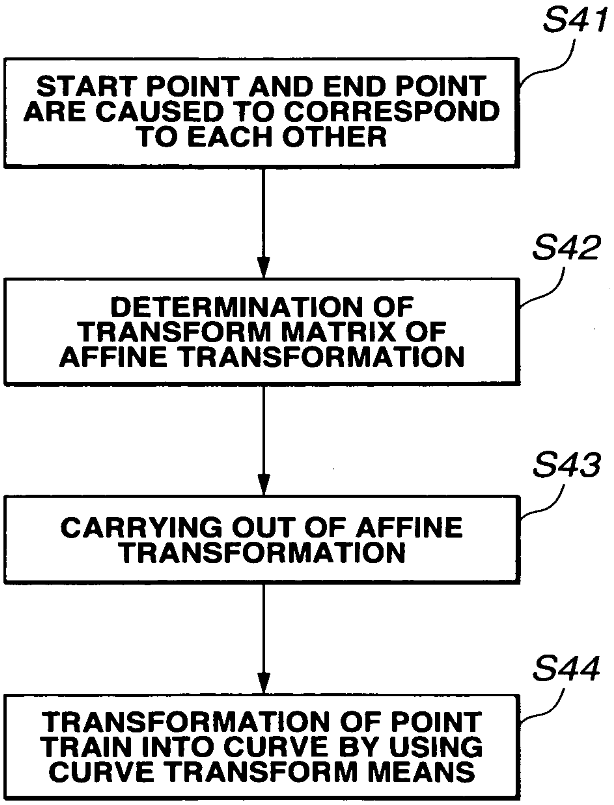

S41
START POINT AND END POINT ARE CAUSED TO CORRESPOND TO EACH OTHER
S42
DETERMINATION OF TRANSFORM MATRIX OF AFFINE TRANSFORMATION
S43
CARRYING OUT OF AFFINE TRANSFORMATION
S44
TRANSFORMATION OF POINT TRAIN INTO CURVE BY USING CURVE TRANSFORM MEANS

FIG.16

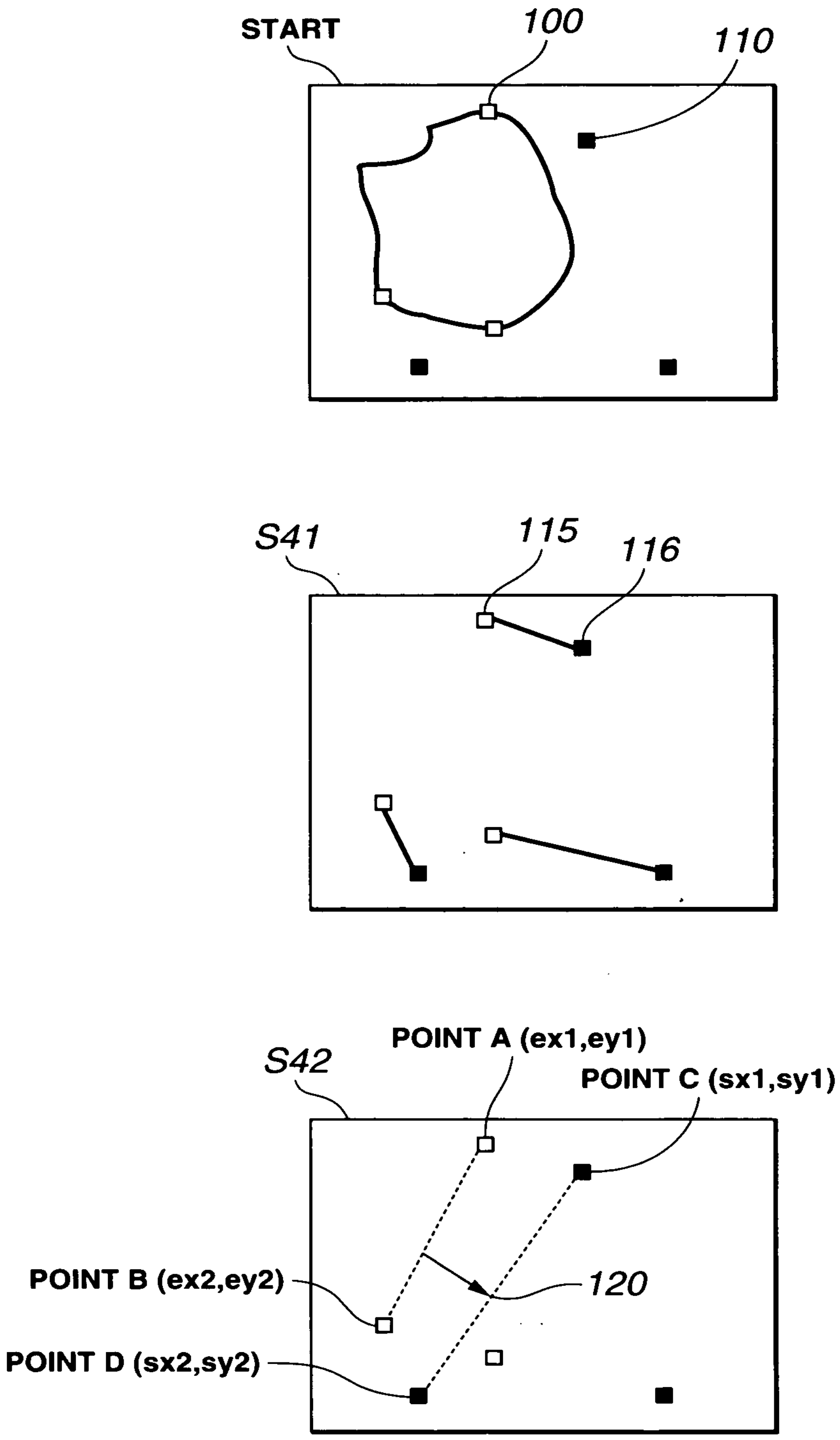

START
100
110
S41
115
116
S42
POINT A (ex1,ey1)
POINT C (sx1,sy1)
POINT B (ex2,ey2)
120
POINT D (sx2,sy2)

FIG.17

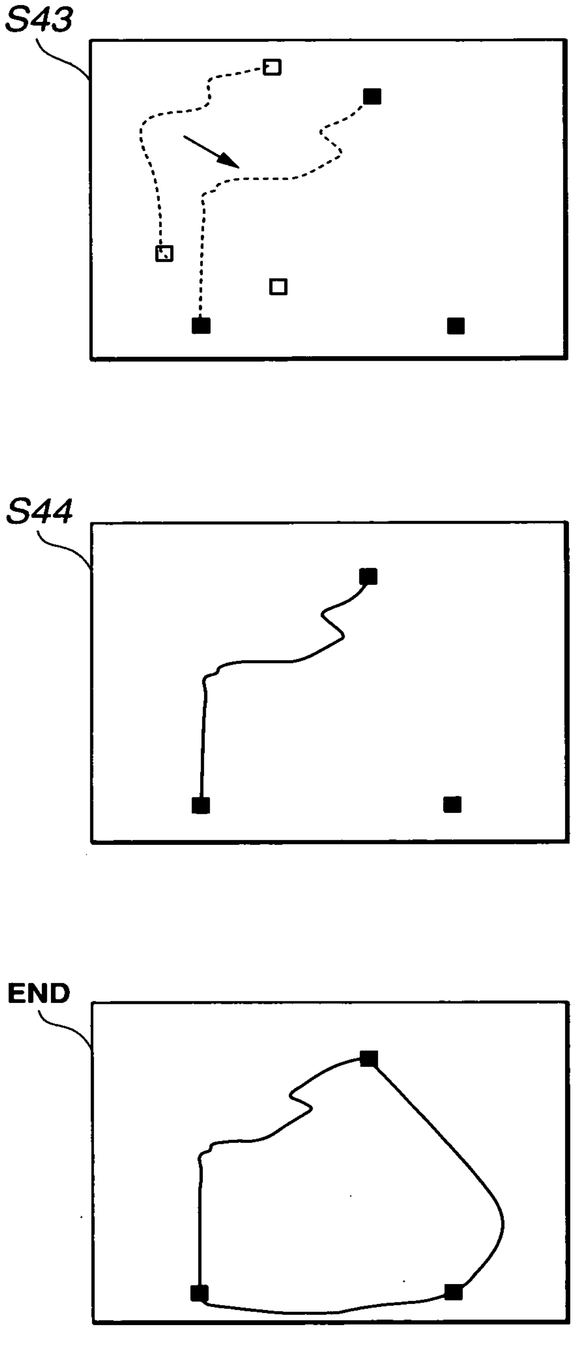


FIG.18

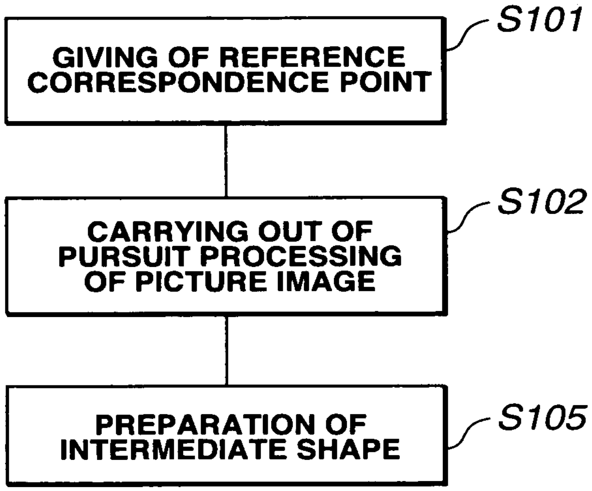

GIVING OF REFERENCE CORRESPONDENCE POINT
S101
CARRYING OUT OF PURSUIT PROCESSING OF PICTURE IMAGE
S102
PREPARATION OF INTERMEDIATE SHAPE
S105

FIG.19

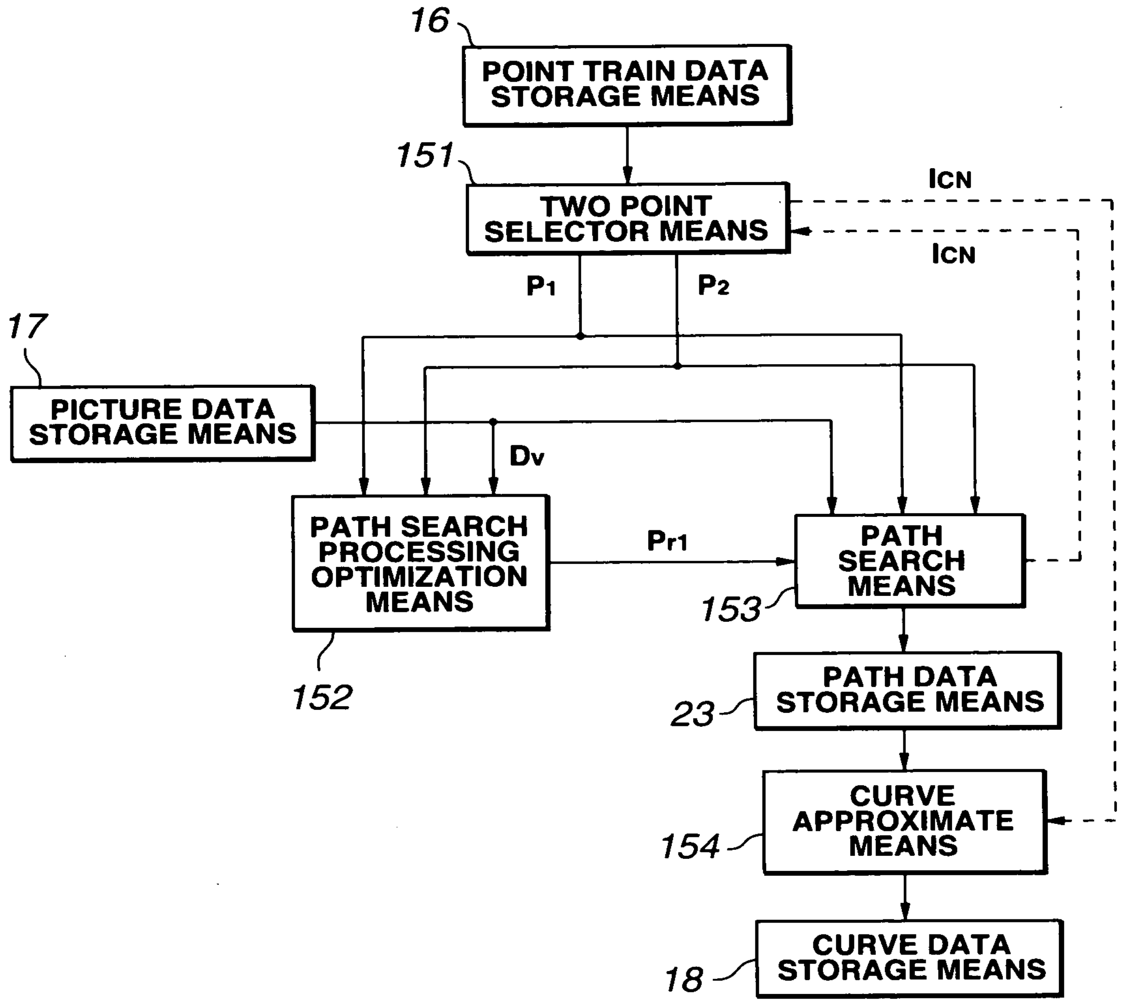

16
POINT TRAIN DATA STORAGE MEANS
151
TWO POINT SELECTOR MEANS
ICN
ICN
P1
P2
17
PICTURE DATA STORAGE MEANS
Dv
PATH SEARCH PROCESSING OPTIMIZATION MEANS
152
Pr1
PATH SEARCH MEANS
153
PATH DATA STORAGE MEANS
23
CURVE APPROXIMATE MEANS
154
CURVE DATA STORAGE MEANS
18

FIG.20

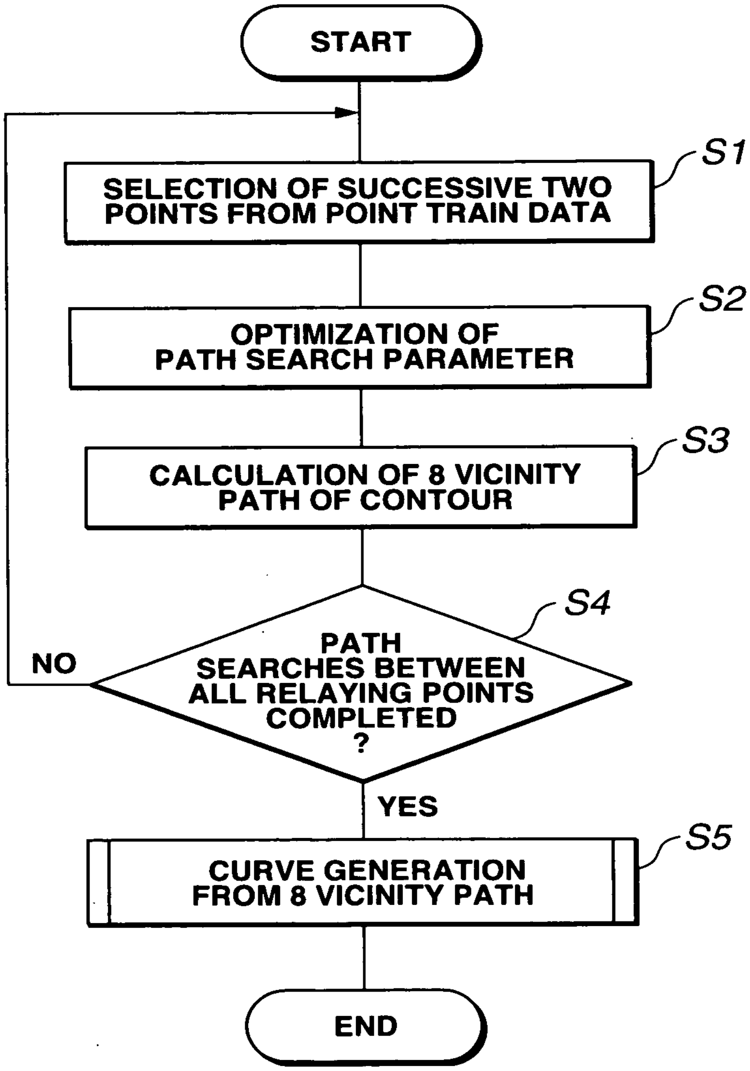

START
SELECTION OF SUCCESSIVE TWO POINTS FROM POINT TRAIN DATA
S1
OPTIMIZATION OF PATH SEARCH PARAMETER
S2
CALCULATION OF 8 VICINITY PATH OF CONTOUR
S3
PATH SEARCHES BETWEEN ALL RELAYING POINTS COMPLETED ?
S4
NO
YES
CURVE GENERATION FROM 8 VICINITY PATH
S5
END

FIG.21

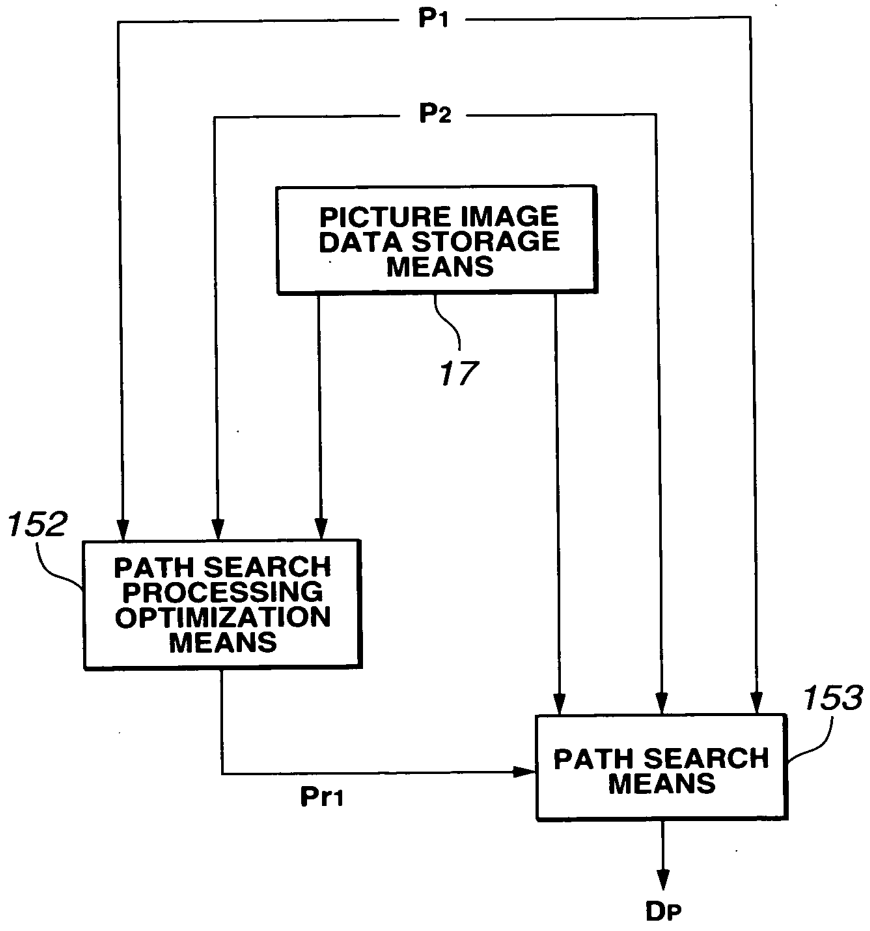

P1
P2
PICTURE IMAGE DATA STORAGE MEANS
17
152
PATH SEARCH PROCESSING OPTIMIZATION MEANS
153
PATH SEARCH MEANS
Pr1
DP

FIG.22

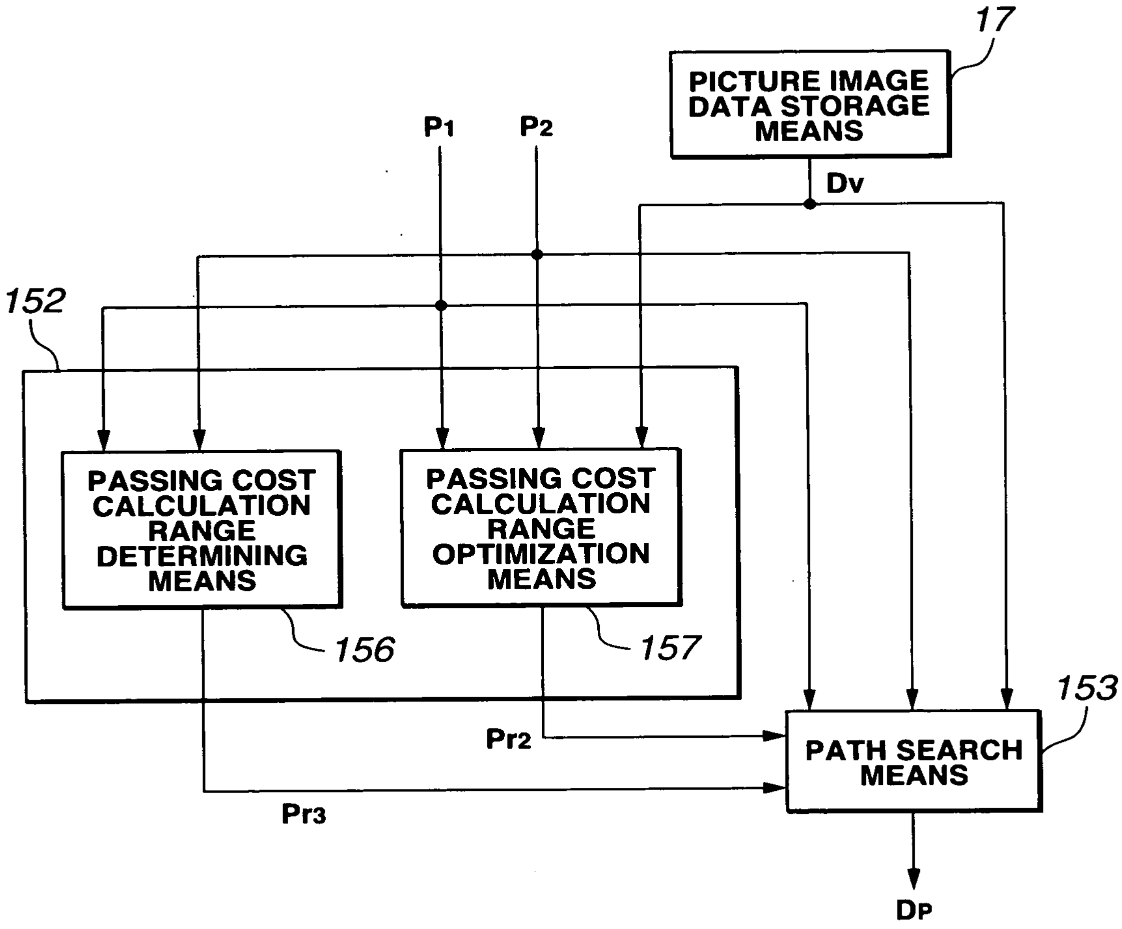

17
PICTURE IMAGE DATA STORAGE MEANS
P1
P2
Dv
152
PASSING COST CALCULATION RANGE DETERMINING MEANS
PASSING COST CALCULATION RANGE OPTIMIZATION MEANS
156
157
153
Pr2
PATH SEARCH MEANS
Pr3
Dp

FIG.23

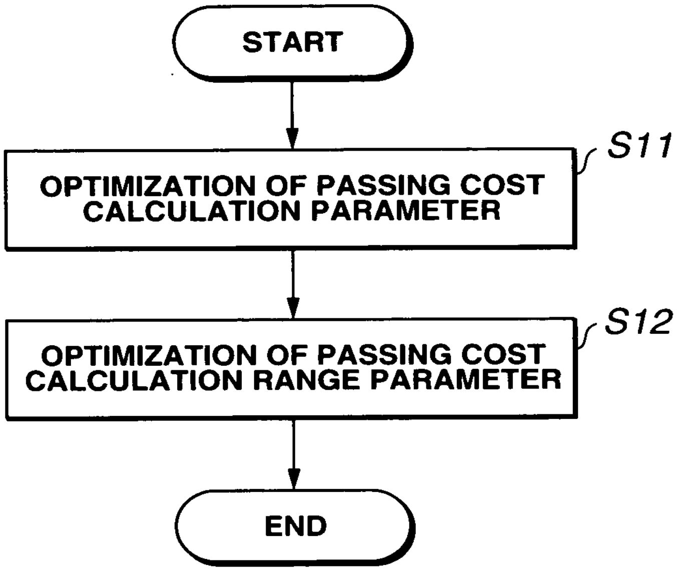

START
S11
OPTIMIZATION OF PASSING COST CALCULATION PARAMETER
S12
OPTIMIZATION OF PASSING COST CALCULATION RANGE PARAMETER
END

FIG.24

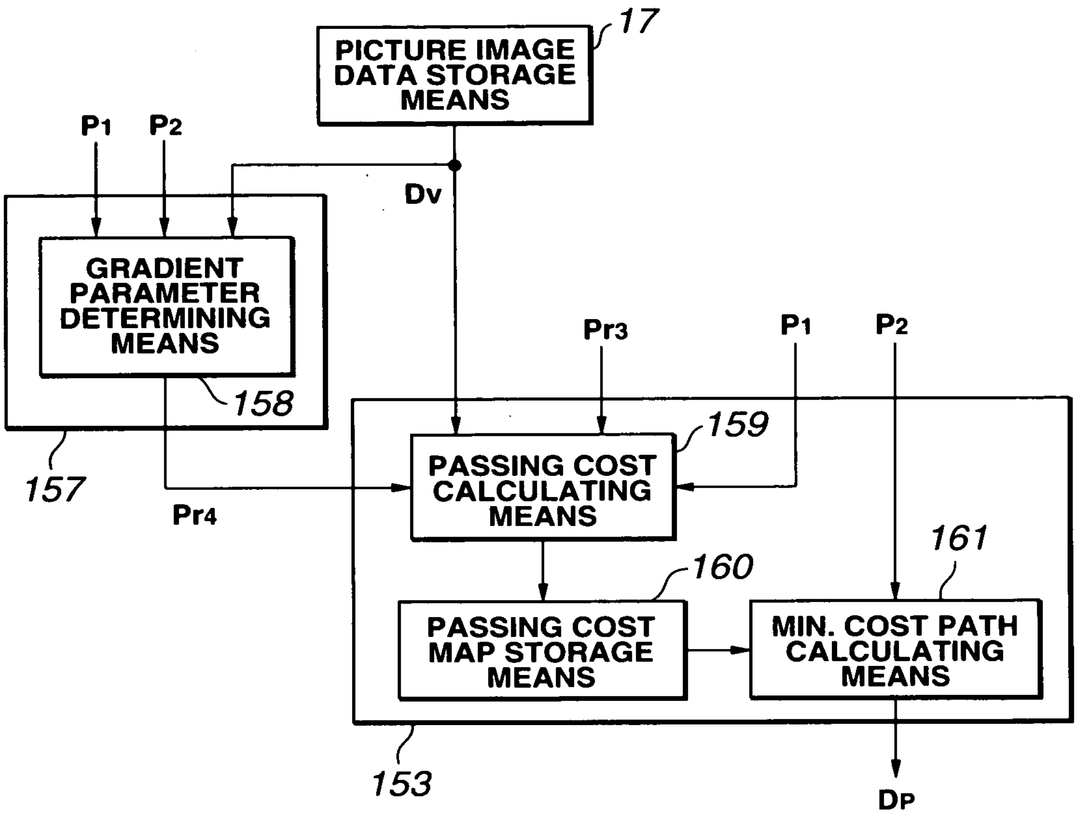

PICTURE IMAGE DATA STORAGE MEANS
17
P1
P2
Dv
GRADIENT PARAMETER DETERMINING MEANS
158
157
Pr4
Pr3
P1
P2
PASSING COST CALCULATING MEANS
159
PASSING COST MAP STORAGE MEANS
160
MIN. COST PATH CALCULATING MEANS
161
153
DP

FIG.25

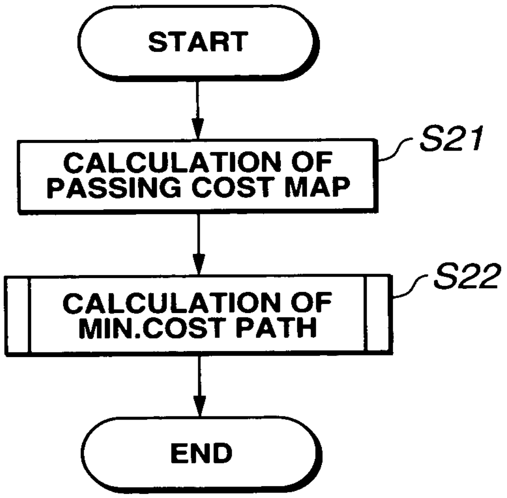

START
CALCULATION OF PASSING COST MAP
S21
CALCULATION OF MIN.COST PATH
S22
END

FIG.26

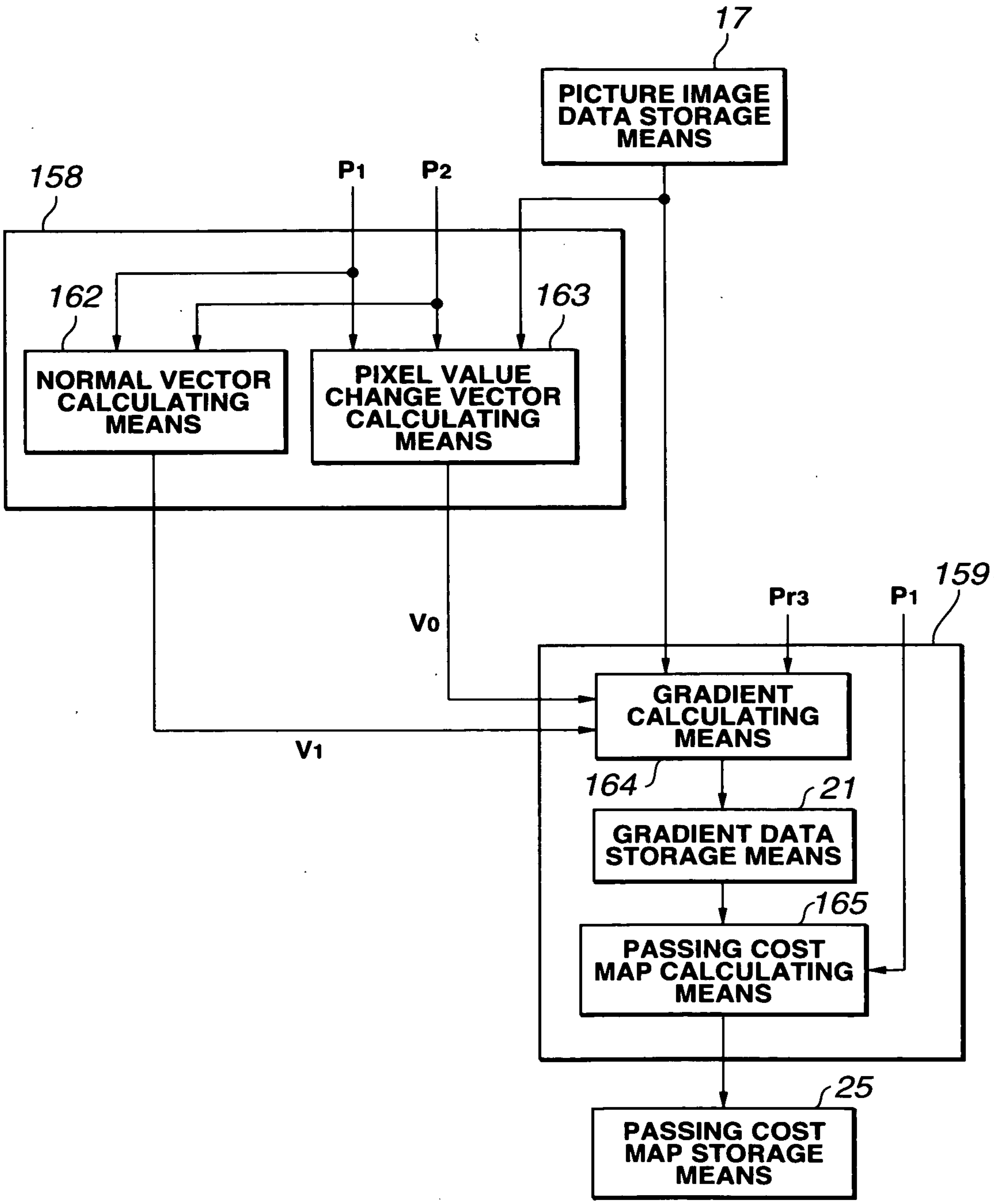

17
PICTURE IMAGE DATA STORAGE MEANS
158
P1
P2
162
163
NORMAL VECTOR CALCULATING MEANS
PIXEL VALUE CHANGE VECTOR CALCULATING MEANS
159
Pr3
P1
V0
GRADIENT CALCULATING MEANS
V1
164
21
GRADIENT DATA STORAGE MEANS
165
PASSING COST MAP CALCULATING MEANS
25
PASSING COST MAP STORAGE MEANS

FIG.27

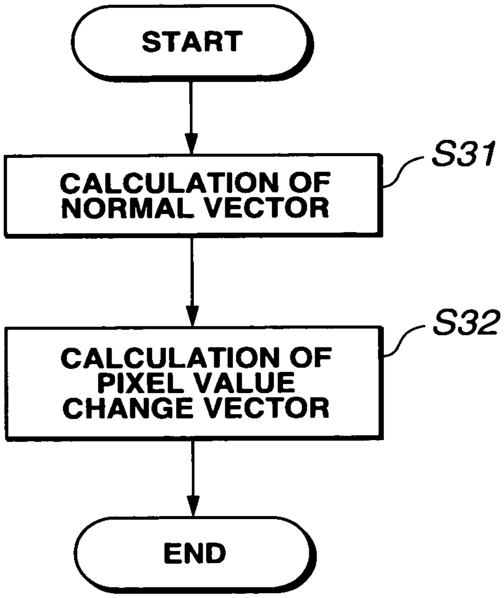

START
CALCULATION OF NORMAL VECTOR
S31
CALCULATION OF PIXEL VALUE CHANGE VECTOR
S32
END

FIG.28

FIG.29A

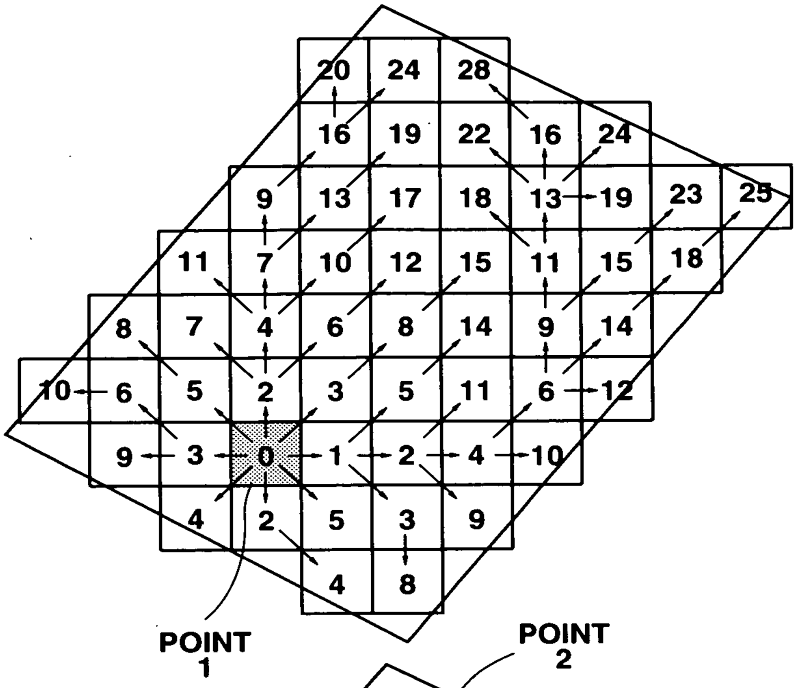
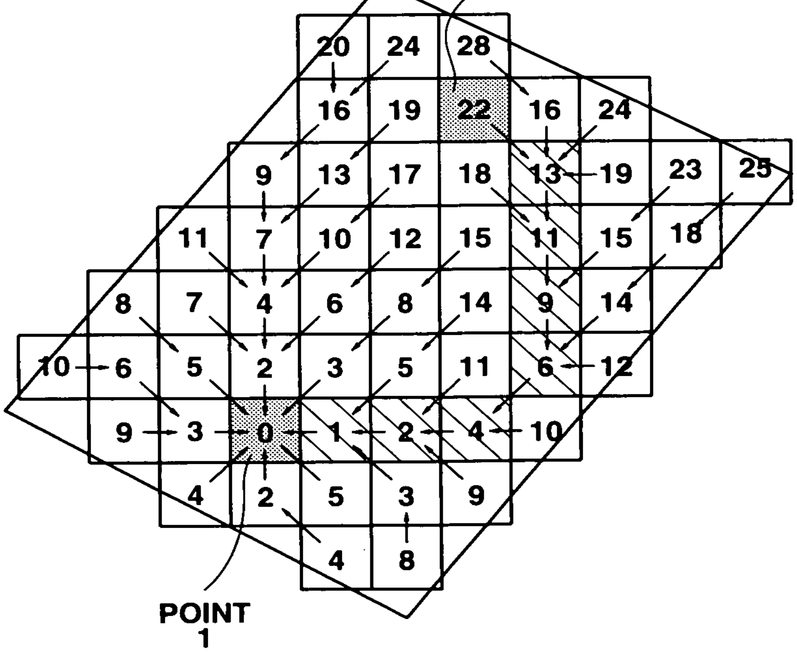


FIG.29B



The Live-Wire 2-D dynamic programming (DP) graph search algorithm is as follows:

Algorithm: Live-Wire 2-D DP graph search.

```
Input:
  s          {Start(or seed) pixel.}
  l(q,r)     {Local cost function for link between pixels q and r.}

Data Structures:
  L          {List of active pixels sorted by total cost (initially empty).}
  N(q)       {Neighborhood set of q (contains 8 neighbors of pixel).}
  e(q)       {Boolean function indicating if q has been expanded/processed.}
  g(q)       {Total cost function from seed point to q.}

Output:
  p          {Pointers from each pixel indicating the minimum cost path.}

Algorithm:

g(s)=0;  L=s;                        {Initialize active list with zero cost seed pixel.}
while L!=NULL do begin               {While still points to expand:}
  q=min(L)                           {Remove minimum cost pixel q from active list.}
  e(q)=TRUE;                         {Mark q as expanded(i.e.,processed).}
   for each r∈N(q) such that not e(r) do begin
     gtmp=g(q)+l(q,r);               {Compute total cost to neighbor.}
      if r∈L and gtmp < g(r) then    {Remove higher cost neighbor's}
        r=L;                         { from list}
      if !(r∈L) then begin           {If neighbor not on list,}
        g(r)=gtmp;                   { assign neighbor's total cost,}
        p(r)=q;                      { set (or reset) back pointer,}
        L=r;                         { and place on (or return to)}
      end                            { active list.}
    end
  end
```

FIG.30

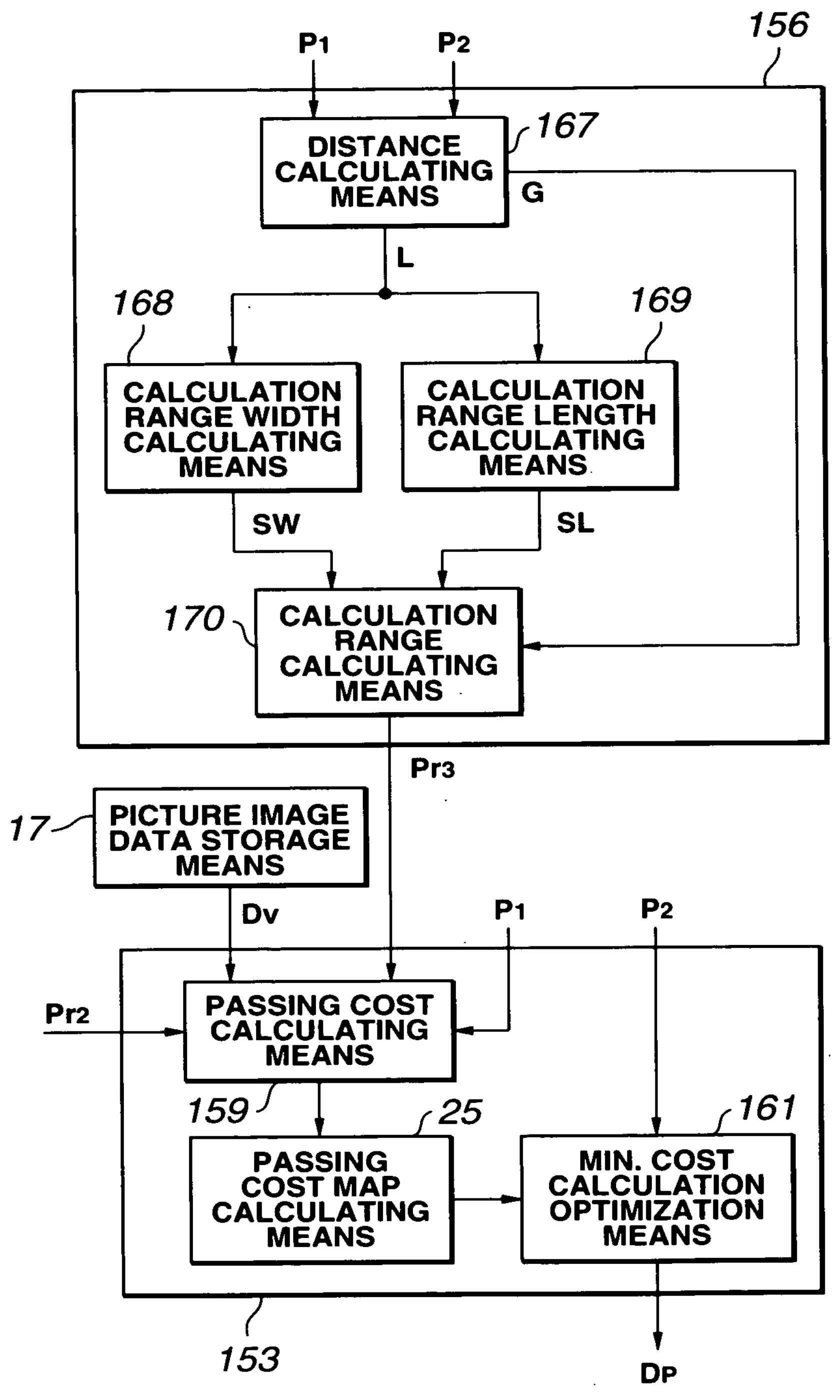

156
P1
P2
DISTANCE CALCULATING MEANS
167
G
L
168
169
CALCULATION RANGE WIDTH CALCULATING MEANS
CALCULATION RANGE LENGTH CALCULATING MEANS
SW
SL
170
CALCULATION RANGE CALCULATING MEANS
Pr3
17
PICTURE IMAGE DATA STORAGE MEANS
Dv
P1
P2
Pr2
PASSING COST CALCULATING MEANS
159
25
161
PASSING COST MAP CALCULATING MEANS
MIN. COST CALCULATION OPTIMIZATION MEANS
153
DP

FIG.31

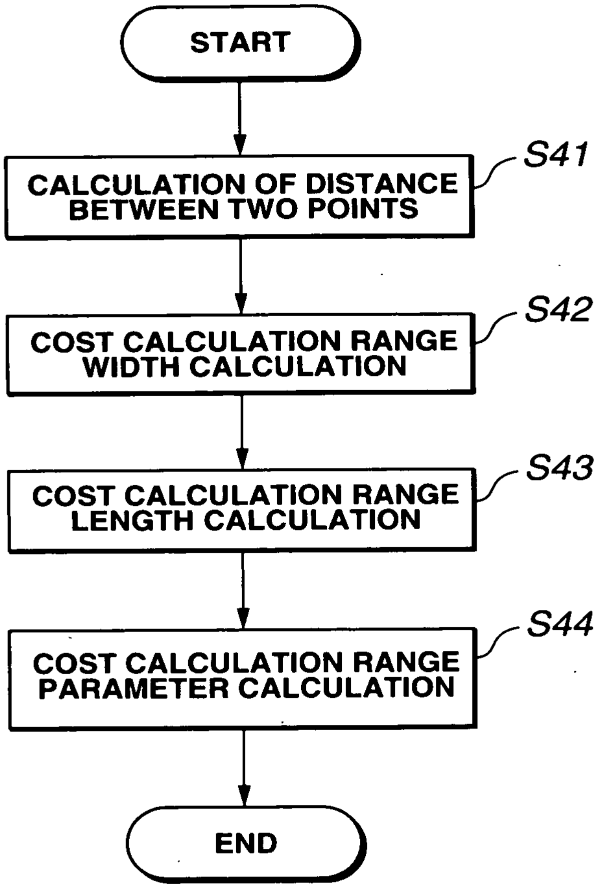

START
CALCULATION OF DISTANCE BETWEEN TWO POINTS
S41
COST CALCULATION RANGE WIDTH CALCULATION
S42
COST CALCULATION RANGE LENGTH CALCULATION
S43
COST CALCULATION RANGE PARAMETER CALCULATION
S44
END

FIG.32

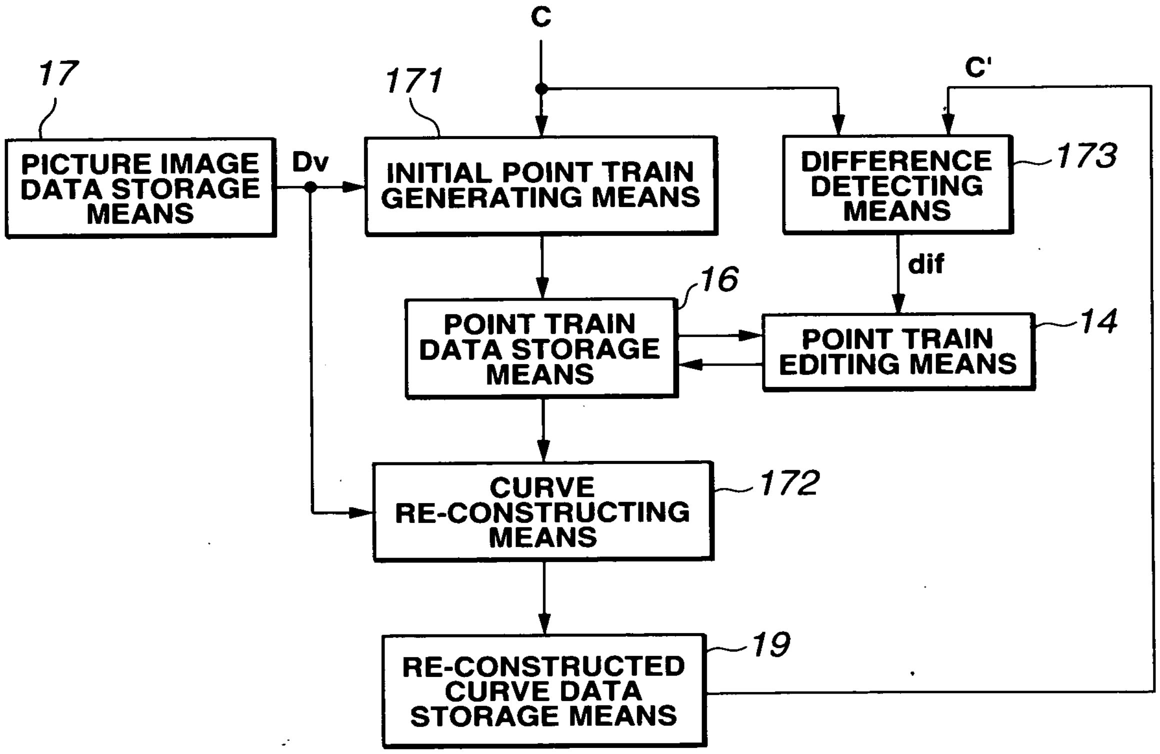

C
17
171
C'
PICTURE IMAGE DATA STORAGE MEANS
Dv
INITIAL POINT TRAIN GENERATING MEANS
DIFFERENCE DETECTING MEANS
173
dif
16
POINT TRAIN DATA STORAGE MEANS
POINT TRAIN EDITING MEANS
14
CURVE RE-CONSTRUCTING MEANS
172
RE-CONSTRUCTED CURVE DATA STORAGE MEANS
19

FIG.33

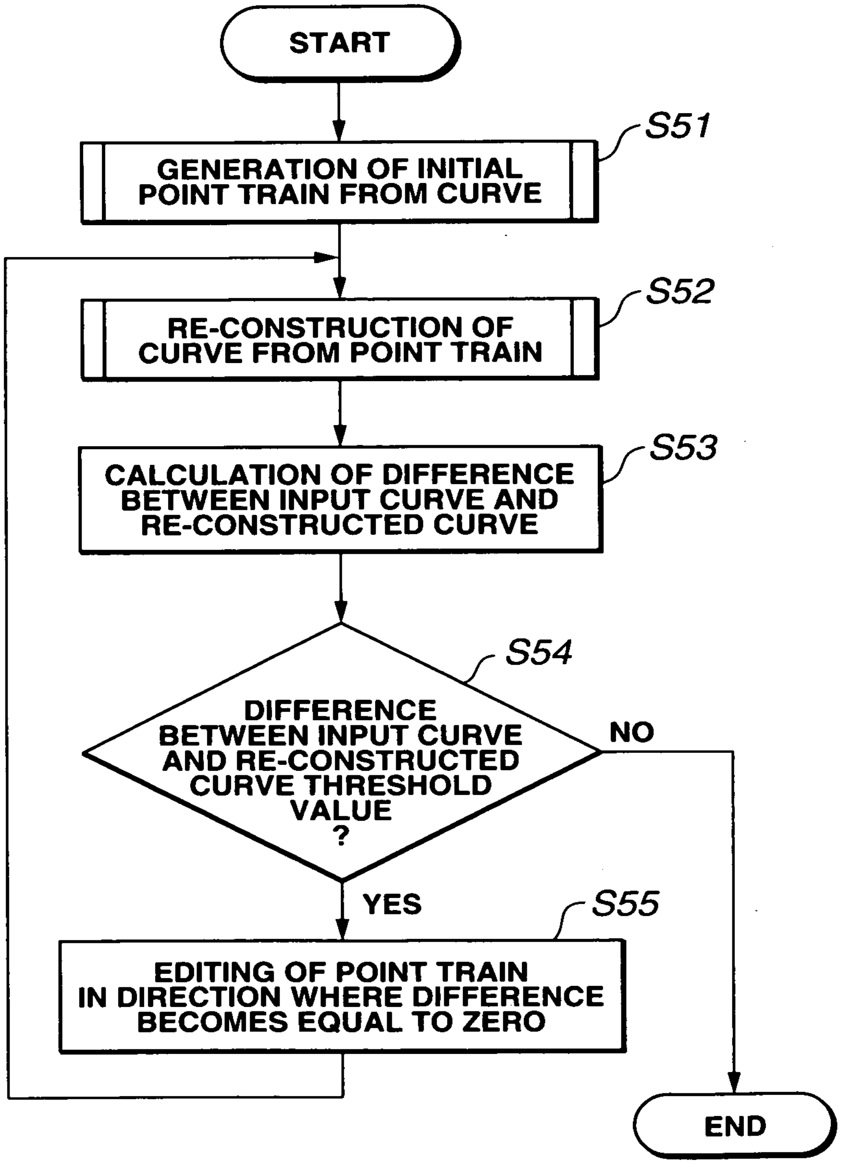
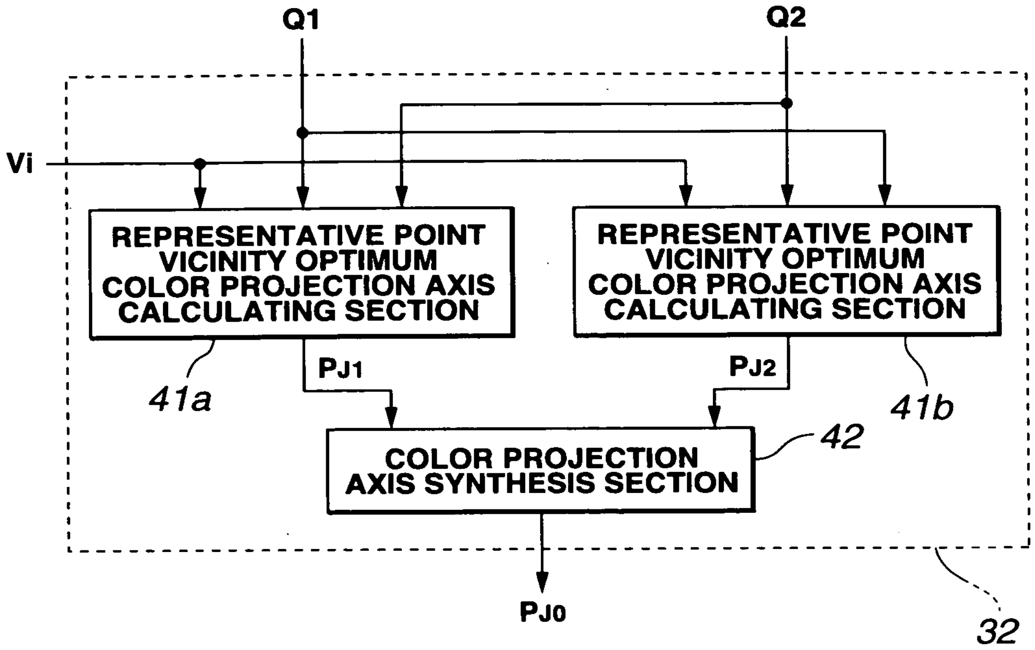
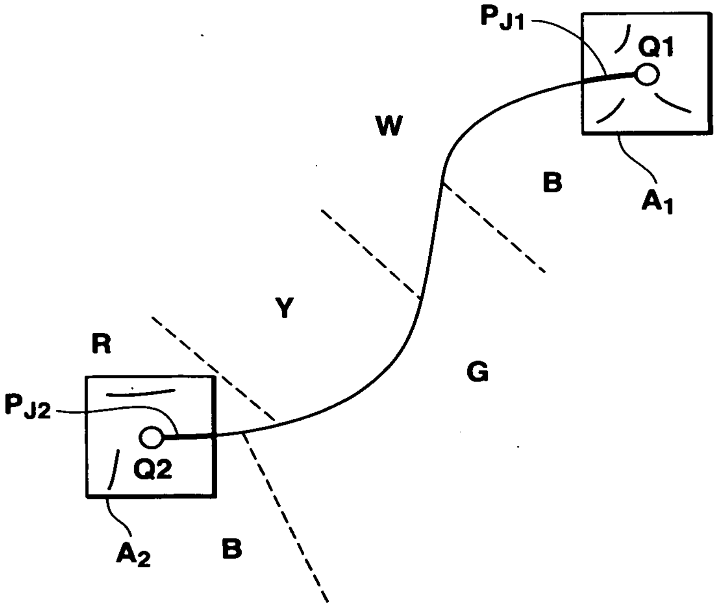

START
S51
GENERATION OF INITIAL POINT TRAIN FROM CURVE
S52
RE-CONSTRUCTION OF CURVE FROM POINT TRAIN
S53
CALCULATION OF DIFFERENCE BETWEEN INPUT CURVE AND RE-CONSTRUCTED CURVE
S54
DIFFERENCE BETWEEN INPUT CURVE AND RE-CONSTRUCTED CURVE THRESHOLD VALUE ?
NO
YES
S55
EDITING OF POINT TRAIN IN DIRECTION WHERE DIFFERENCE BECOMES EQUAL TO ZERO
END

FIG.34



Q1
Q2
Vi
REPRESENTATIVE POINT VICINITY OPTIMUM COLOR PROJECTION AXIS CALCULATING SECTION
REPRESENTATIVE POINT VICINITY OPTIMUM COLOR PROJECTION AXIS CALCULATING SECTION
PJ1
PJ2
41a
41b
COLOR PROJECTION AXIS SYNTHESIS SECTION
42
PJ0
32

FIG.35



PJ1
Q1
W
B
A1
Y
R
G
PJ2
Q2
A2
B

FIG.36

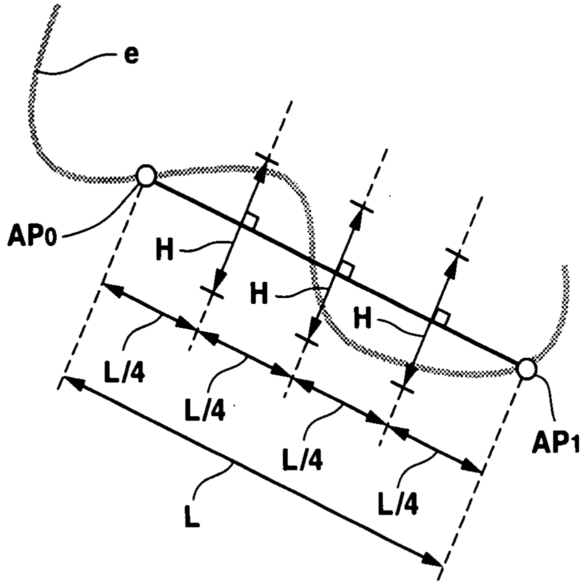


FIG.37A

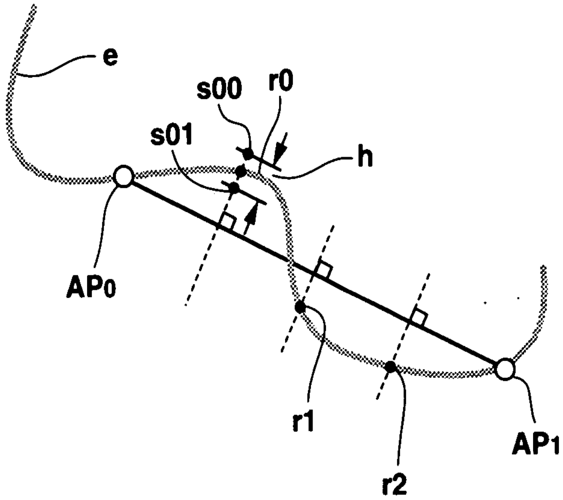


FIG.37B